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Draft October ~~20~~27, 2015

Limited Soil Confirmation Evaluation
Riverside Agricultural Park
7020 Crest Avenue
Riverside, California

Background

The Riverside Agricultural Park (Site) is an approximate 60 acre property located in the City of Riverside between Van Buren Boulevard and Tyler Street, south of the Santa Ana River. Figure 1 depicts the site vicinity. The property formerly housed a sewage treatment plant initially constructed by the United States Army in 1942 to address waste water generated at Camp Anza. Between 1947 and 1954 various private or municipal entities continued operation of the plant to accept waste water from the surrounding community which included residential, commercial and industrial uses. In 1965, the plant ceased to operate and sat idle until 2003 when the Site was slated for redevelopment. During site demolition activities, a sewage digester was broken and liquid flowed out onto the unprotected ground. The liquid was found to contain high levels of polychlorinated biphenyls (PCBs). This discovery started the process of environmental evaluation, leading to the request for DTSC oversight.

DTSC provided oversight on the investigation and remediation of the (PCB) contaminated soil at the Site, first under a Voluntary Cleanup Agreement (VCA) with the City of Riverside, and then transitioned to a California Land Reuse and Revitalization (CLRRA) Agreement with a developer, Friends of the Riverside Airport, signed in 2006. After several iterations of investigation and two phases of remediation (resulting in the removal of ~204,000 tons of material), the Site was closed and certified for unrestricted land use in April 2014; and immunities under CLRRA attached. The Site is a currently a vacant parcel in the early stages of residential development, but all development activities have been placed on hold until further notice.

The Center for Community Action and Environmental Justice (CCAEJ) wrote a letter to DTSC and other regulatory agencies in March 2015, requesting both a re-analysis of Site data and EPA involvement. DTSC participated in a 'toxic site' bus tour with CCAEJ on March 31st, met with CCAEJ face-to-face on April 28th. On May 27th, CCAEJ sponsored a community meeting where a panel listened to testimony presented by concerned neighbors and citizens. During this period, DTSC also participated in multiple meetings and calls with the City of Riverside and the developer in an effort to address the concerns that had been raised.

Current Site Condition

Since completion of the remedial excavations in early 2014, the site has been graded for residential development. Individual residential lots have been rough graded as well as all public right of ways including sidewalk and street areas. Within the future Jurupa Avenue extension utility installation had begun including the installation of some sewer and storm water control features. Due to a Stop-Work order initiated by the City of Riverside, all activities have ceased at the property. A significant amount of vegetative growth has occurred across the site during this time of no activity. Representative site photographs are included as Appendix A.

September 2015 Re-confirmation Sampling

In an effort to alleviate concerns raised, DTSC and the United States Environmental Protection Agency (EPA) Region IX Corrective Action Section collaborated on a sampling plan to re-confirm the Site cleanup, to ensure that the Site conditions have not changed, and that the Site continues to remain safe for neighbors, future workers and homeowners. To ensure the integrity of the re-confirmation sampling, DTSC and EPA implemented the following measures:

1. For the purposes of contracting drilling and surveying services, the developer was asked to utilize the services of one of DTSC's zone contractors for the Southern California Region, who had no previous involvement with the Site;
2. DTSC staff conducted the field work and collected the samples with logistic support provided by the selected DTSC zone contractor;
3. Samples were analyzed by DTSC's contract laboratory; and,
4. EPA collected co-located samples to be analyzed at the EPA laboratory.

Differing Analytical Extraction Methodologies

Soil samples collected during the re-confirmation sampling were analyzed for PCBs by EPA Method 8082A. The Method 8082A methodology for soil analysis of PCBs includes several extraction techniques, including Soxhlet (Methods 3540 and 3541), pressurized fluid extraction (Method 3545) and ultra-sonic (Methods 3550). It is standard procedure to request the specific analytical methodology for each sample; however, specification of the extraction method is a laboratory decision.

During the previous soil analysis work conducted at the Site, both the ultra-sonic and pressurized fluid extraction methods of extraction were utilized for different events. For this most recent sampling event, DTSC's laboratory used the ultra-sonic method of extraction, while EPA's laboratory used the Soxhlet method. While all previous sampling results are considered valid, the results from the Soxhlet method, in comparison to the ultra-sonic method of extraction, were consistently elevated for the soil samples collected from this Site.

Additional soil sampling is being required to clarify the uncertainties raised by the variation of data from these two different extraction methods for PCBs.

Overview of September 2015 Re-confirmation Sampling

To address the concerns of the community and to re-confirm the results of previous site cleanup activities, DTSC undertook a soil and groundwater sampling program. Eighty-eight (88) discrete soil samples, representing 46 locations across the site, were collected as well as eight duplicate samples for delivery to the DTSC contract laboratory. Additionally, two groundwater wells were installed and sampled to assess the current condition of groundwater beneath the site. The EPA provided oversight for the surface soil sampling and collected co-located samples for delivery to their own laboratory. DTSC's zone contractor, The Source Group, provided contracting and logistical support; however, all samples were collected, handled and transported to the laboratory by DTSC staff.

Soil Sampling

On August 30, 2015, DTSC was onsite with a licensed surveyor to locate the approximate center of 39 grids (250 by 250 feet in size per grid) across the site. Locations were identified using Global Positioning System (GPS) technology accurate to within three centimeters. Each location was marked with a steel nail and pink marking whisker for ease of relocation. Additionally, the proposed location of two groundwater monitoring wells were marked. Each grid was identified using a letter and numbering system to facilitate sample identification. The attached Figure 2 depicts the grids as well as the grid identification system. The surveyors report is included as Appendix B.

On September 1, 2015, DTSC returned to the site to collect surface soil samples from each of the 39 grid locations under the oversight of EPA. Single use disposable plastic trowels were used to collect near surface soil (0 to three inches) for transfer into four ounce glass jars with screw on lids. Sample containers were sealed with tamper evident security tape, labeled with sample identification, site name, time of collection and initials of sampler prior to placement into a cooler with ice. Sample information was transferred to chain-of-custody documents prior to transportation.

In addition to the surface soil samples, select locations were identified for the advancement of soil borings to collect subsurface soil samples. Due to the difficult drilling conditions posed by the decomposed granitic subsurface material, on September 2, 2015 a Central Mine Equipment (CME) 85 drilling rig was mobilized to the site to advance soil borings. Soil samples were collected at depths of two feet, five feet and eight feet below ground surface (bgs) from boring locations MW-6R, D3a, C4a, E4a, C5, MW-7R, C6a, E6a, D7 and F7. Additionally, deeper soil samples were collected until groundwater was encountered at locations MW-6R (10, 15, 20, 25, 30 and 35), C4a (10, 15, and 20), MW-7R (10, 15, 20 and 24), C6a (10, 15 and 20) and E6a (10, 15 and 20). The boring logs attached in Appendix C describe the soils and sample depths for deeper boring locations.

All soil samples were placed and transported in chilled coolers under chain-of-custody protocols to the DTSC contract lab, Advanced Technology Laboratories (ATL) in Signal Hill, California.

A total of 88 primary soil samples and eight duplicate soil samples were analyzed for PCBs. Select soil samples were also analyzed for dioxins/furans, metals and perchlorate. Laboratory analytical data are summarized on the attached Tables 1 through 3, and laboratory reports are included in Appendix D.

<u>Groundwater Well Installation and Development</u>

Boring locations MW-6R and MW-7R were converted to groundwater monitoring wells to assess the groundwater conditions near location of historic elevated detections (MW-6 and MW-7). After collection of the soil samples, the CME 85 drilling rig advanced 18-inch outer diameter hollow stem augers and placed a 10.5-inch diameter steel conductor casing in MW-6R (surface to 30 feet bgs) and MW-7R (surface to 19 feet bgs) and cemented them in place. After the cement had cured, 8-inch outer diameter hollow stem auger flights were used to drill to the total depth of each well (MW-6R – 43.5 feet bgs, MW-7R – 29 feet bgs). Two inch diameter polyvinyl chloride (PVC) casing with 15 and 10 feet of 0.010-inch slotted casing was installed, respectively. Sand filter pack surrounding the slotted casing consists of #2/16 screened sand. A transition seal consisting of bentonite chips, hydrated in place, was placed above the sand pack. The remainder of the annular space was filled with bentonite/cement grout as required by with County of Riverside well standards. The surface completion consists of 10-inch diameter steel raised monuments set in concrete. Well construction details are included on the attached Table 7 as well as on boring logs in Appendix C.

On September 10, 2015, both of the newly installed groundwater monitoring wells were developed to ensure representative groundwater samples could be obtained. Wells were surged and bailed using a Pulsar development rig. After surge and bail operations, each well was pumped using a 1.5-inch diameter Proactive Mega Monsoon electric pump to remove water from the well. Approximately 1.5 borehole volumes of groundwater were removed from MW-6R and 2.5 borehole volumes of groundwater were removed from MW-7R. Well development logs are included in Appendix E.

The licensed surveyor also returned to the site on September 10, 2015 to survey boring locations which were added to the program or had a revised location based upon field conditions as well as to survey the completed groundwater well measurement points. The surveyors report is included as Appendix B.

Groundwater Well Gauging, Purging and Sampling

On September 24, 2015 the groundwater surface was measured, to the nearest 0.01 foot using a Heron dipper-T water level indicator and then wells were purged and sampled. Purging and sampling activities were conducted using a 1.5-inch diameter Proactive 4 stage Mini Monsoon electric pump. Low flow (minimal drawdown) procedures were utilized. Stabilization criteria (temperature, pH, oxidation reduction potential, conductivity, dissolved oxygen, total dissolved solids and turbidity) were monitored throughout the purging process using a YSI Professional Series Plus water quality meter equipped with a flow through cell and a LaMotte model 2020WE turbidity meter. Water quality measurements were recorded approximately every ¼ gallon until parameters stabilized within approximately 10% of the previous two readings. Groundwater sample field logs are included in Appendix E.

Upon achieving stabilization, collection of groundwater into laboratory approved containers commenced. Sample containers were sealed with tamper evident security tape, labeled with sample identification, site name, time of collection and initials of sampler prior to placement into a cooler with ice.

All groundwater samples were placed and transported in chilled coolers under chain-of-custody protocols to the DTSC contract lab, Advanced Technology Laboratories (ATL) in Signal Hill, California.

All groundwater samples were analyzed for polychlorinated biphenyls (PCBs) by EPA Method 8082, dioxins/furans by EPA Method 8290A, metals by EPA Methods 6020 and perchlorate by EPA Method 314.0. Laboratory analytical data are summarized on the attached Tables 4 through 6, and laboratory reports are included in Appendix D.

Investigation Derived Waste

Investigation derived waste (IDW) generated during this project consisted of soil cuttings, decontamination water, and groundwater development and purge water. All generated IDW was stored in labeled United Nations (U.N.)-rated, 55-gallon drums prior to transport offsite. Drums of soil cuttings and decontamination water were removed from the site on September 24, 2015 under non-hazardous waste manifest. Drums containing monitoring well development and purge water are awaiting transport as of the date of this letter report. Manifests completed by the receiving facility are attached in Appendix F.

September 2015 Re-confirmation Sampling Results

All chemical analytical results for soil and groundwater are presented in the attached data summary tables and laboratory reports, and the key findings are discussed below. Soil samples collected during the re-confirmation sampling were analyzed for PCBs by EPA Method 8082A. Select soil samples were also analyzed for dioxins/furans by EPA Method 8290A, metals by EPA Methods 6020 and perchlorate by EPA Method 314 (Modified).

Soil Sample Results

Three PCB mixtures (Aroclor 1248, Aroclor 1254 and Aroclor 1260) were detected above their respective laboratory reporting limits. Of the 46 locations sampled, nine locations had concentrations in excess of the EPA Regional Screening Level (RSL) of 0.23 milligrams per kilogram (mg/kg) for PCB (high risk) in Residential Soils (EPA 2015). Reported concentrations ranged from non-detect to a maximum total PCB concentration 18.2 mg/kg which was identified at boring location B4. Laboratory results for PCBs in soil are summarized on the attached Table 1.

Metals including arsenic, barium, calcium, chromium, cobalt, copper, iron, lead, manganese, molybdenum nickel, sodium, thallium, vanadium and zinc were detected above their respective reporting limits. For screening purposes, metals were compared to the EPA RSLs and DTSC-Modified Screening Levels (DTSC 2015a) for Residential Soils and the Riverside Agricultural Park soil background data collected in the Remedial Investigation (Geomatrix 2006). All detected metals concentrations are below the RSLs, with the exception of arsenic. Arsenic was within the background range for the Riverside Agricultural Park. All metals results are consistent with the soil background concentrations. Analytical results for metals in soil are summarized on the attached Table 2.

Some dioxin/furan congeners and homologs were detected in the soil samples above the laboratory reporting limits as shown on the attached Table 3. For comparison purposes the dioxin/furan concentrations were converted to Toxicity Equivalency Quotient (TEQ) values using the World Health Organization (WHO) Toxic Equivalency Factors (TEF). The TEQ for each sample was calculated by multiplying the detected concentration of each congener with the corresponding TEF and adding the products of all the dioxin-like congeners for each sample. The TEQ for all the samples are below the EPA RSL of 4.8 picograms per gram [pg/g] as well as the DTSC Interim Remediation Goal of 50 pg/g (DTSC, 2009). Laboratory results for dioxin/furans in soil are summarized on the attached Table 3.

Perchlorate was not detected above laboratory reporting limit (5.8 micrograms per kilogram) in any soil sample. Laboratory results for perchlorate in soil are also summarized on the attached Table 3.

Groundwater Sample Results

No PCB Aroclors were identified above laboratory reporting limits in groundwater samples collected from groundwater monitoring wells MW-6R nor MW-7R. Laboratory reporting limits for individual Aroclors range from 0.50 to 1.0 micrograms per liter (µg/L). Laboratory results for PCBs in groundwater are summarized on the attached Table 4.

Metals including antimony, arsenic, barium, beryllium, cadmium, calcium, chromium, cobalt, copper, iron, lead, manganese, molybdenum, nickel, potassium, selenium, sodium, vanadium and zinc were detected above their respective reporting limits. For screening purposes, metals were compared to the California Modified Maximum Contaminant Levels (California MCLs) for drinking water. All detected metals concentrations are below the MCLs. Laboratory results for metals in groundwater are summarized on the attached Table 5.

No dioxin/furan congeners and homologs were identified above laboratory reporting limits in groundwater samples. Laboratory reporting limits for individual congeners ranged from 1.91 to 17.3 picograms per liter (pg/L). The calculated TEQ for groundwater samples MW-6R and MW-7R were both 0.0. Laboratory results for dioxin/furans in groundwater are summarized on the attached Table 6.

Perchlorate was not detected above laboratory reporting limit (10 µg/L) in groundwater monitoring well MW-6R and at an estimated value (between method detection limit and reporting limit) of 4.1J µg/L in groundwater monitoring well MW-7R, which is below the California MCL of 6 µg/L. Laboratory results for perchlorate in groundwater are summarized on the attached Table 6.

Screening-Level Health Risk Evaluation

A screening-level human health risk evaluation was conducted using the soil sampling data collected by DTSC to evaluate if the Site is suitable for residential land use. The methodology and assumptions used in this evaluation are described in the DTSC Human Health Risk Assessment (HHRA) Note 4 (DTSC 2015b), and are consistent with EPA risk assessment guidance (EPA 1989).

Because PCB and dioxin/furan concentrations in some soil samples exceed the screening levels, these chemicals were retained as chemicals of potential concern (COPCs) in the screening-level risk evaluation. As discussed above, all detected metals concentrations are within the soil background range for the Riverside Agricultural Park and thus are not considered COPCs for the Site.

Based on the proposed residential development for the Site, the soil data were grouped into three different decision units: proposed residential lots, proposed development area (including roadways), and the former Agricultural Park property (i.e., the Site). The first two decision units are based on the current development plan which covers about two-third of the Site. To estimate exposure point concentrations (EPC) for soil, 95% upper confidence limit (95UCL) concentrations of the mean were calculated for PCBs and dioxin/furans (TEQ) in shallow (0-2 feet) and deep (0-10 feet) soils for each decision unit. If the data set has fewer than six samples, the 95UCL concentration was not calculated and the maximum concentration was conservatively used as the EPC for the decision unit. A statistical summary of the PCB and dioxin/furan data and corresponding 95UCL concentration for each decision unit are presented in Appendix G.

Table 8 shows the corresponding cancer risks and noncancer hazards for residential exposure to shallow and deep soils using the calculated 95UCL or maximum (if 95UCL concentration was not calculated) concentrations for the three decision units:

- For the proposed residential lots, the cancer risks are at $1x10^{-6}$ and the noncancer hazards are below one for exposure to shallow and deep soil by future residents.

- For the proposed development area (including common areas and streets/roadways), the cancer risks range from $2x10^{-6}$ (shallow soil) to $7x10^{-6}$ (deep soil), and the noncancer hazards are at or below one for future residents. The higher cancer risk for deep soil is driven by the PCB concentrations detected at 5 and 8 feett bgs from the soil boring MW-7R.

- For the entire former Agricultural Park property (including undeveloped areas), the cancer risk and noncancer hazard for shallow soil are $7x10^{-6}$ and one, respectively, and they are driven by the PCB concentration detected in the soil sample collected from Grid B4. The cancer risk and noncancer hazard for deep soil are $8x10^{-6}$ and two, respectively, driven by the PCB concentrations detected in the soil samples collected from Grid B4 and MW-7R.

In summary, the total cancer risks for future residents are within the low end of the risk management range ($1x10^{-6}$ to $1x10^{-4}$), and the noncancer hazards are at or below one except for exposure to deep soil on a site-wide basis. It should be noted that MW-7R is located on a street that will be paved, so direct exposure to soil beneath the pavement is unlikely for future residents.

EPA Co-Located Sample Results

EPA collected co-located samples from seventeen locations, and two duplicate samples, totaling nineteen samples. These samples were analyzed by the EPA Region IX laboratory, using Method 8082, similar to the samples collected by DTSC. However, the EPA laboratory utilized the Soxhlet methodology for PCB extraction, rather than the ultra-sonic method of extraction used by the DTSC laboratory. As mentioned previously, both extraction methodologies are permissible. When the data for the co-located samples were compared, the samples utilizing the Soxhlet method of extraction were generally comparable to but slightly higher than the data generated from the ultra-sonic method of extraction.

Conclusions/Recommendations

The cancer and noncancer risk has been determined to be within the acceptable range for planned site use, consistent with previous findings. Further sampling is being requested to clarify uncertainties raised through the comparison of the ultra-sonic and the Soxhlet extraction methods for PCBs. The developer has been asked to submit a workplan for the additional sampling.

References

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EPA, 2015. Regional Screening Levels for Chemical Contaminants at Superfund Sites, June 2015. ([HYPERLINK "http://www.epa.gov/risk/regional-screening-table"]).

EPA, 2007. Test Methods for Evaluating Solid Waste, Physical/Chemical Methods, METHOD 8082A Polychlorinated Biphenyls (PCBs) By Gas Chromatography, SW-846 Revision 1.

Attachments

Figures

Figure 1 - Site Vicinity Map
Figure 2 - Soil Boring Location Map

Tables

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Table 2 - Metals in Soil
Table 3 - Perchlorate and Dioxin/Furans in Soil
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